F.G.E., LTD.

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File No. 328-1
October 29, 1980

Mr. Evan Cruthers
c/o Media Five, Ltd.
345 Queen Street
Honolulu, Hawaii 96813

Subject: HALE KUALONA SUBDIVISION
Aunauna Street, Kailua, Hawaii
Tax Map Key: 4-2-30: 100

Dear Mr. Cruthers:

On October 6, 1980 we drilled two test borings at the locations shown on the Site and Boring Location Plan, Figure 1, to investigate the subsurface conditions and to develop recommendations for the design and construction of the foundations and earthwork for the proposed residences and the recreation facility. This letter summarizes our findings and conclusions.

Introduction - It is our understanding that two residences will be constructed on the northwestern two-thirds of the site and a recreation area with a tennis court and swimming pool will be constructed adjacent to the street.

The parcel is essentially rectangular-shaped and is approximately 500 feet deep and 200 feet in width. The existing site is approximately a 2:1 slope from Elev. 256 at the street to approximately Elev. 235 at a distance of 120 feet from the street. The remaining portion is a rounded knoll with a maximum elevation of approximately 260 feet.

The proposed site grading will cut the knoll to approximately Elev. 235 for the construction of the two dwellings. A combination of cut and fill will be needed to grade the tennis court and pool area. It is anticipated that the cuts will reach maximum depths of 20 to 25 feet. The fills will reach approximately 15 feet in thickness at the northeast corner of the proposed tennis court.

Several retaining walls will be utilized for grade separations and support of the tennis court fill. Retaining walls are also planned adjacent to Aunauna Street near the front of the property.

Subsurface Conditions and Recommendations - Test Boring 1 was an auger boring drilled to a depth of 35 feet near the top of the knoll at elevation 259± feet. This boring penetrated weathered basalt for its full depth. The material varied from soft to medium hard on the rock hardness scale and was penetrated with minor difficulty by the augers. This indicates that the material can generally be removed by earthmoving equipment with rippers for the occasional hard seam. The excavated material should break down into a rocky soil which can be utilized as fill for the tennis court.

Foundations bearing upon the decomposed basalt can be designed for maximum contact bearing pressures of 6,000 pounds per square foot with little or no settlements. The foundations should maintain a minimum embedment of 6 inches and a minimum width of 12 inches. Slope cuts within the weathered decomposed basalt can be made at 1 Horizontal to 1 Vertical (1:1) slopes with adequate stability.

Test Boring 2, drilled within the retaining wall area near the front of the property, encountered approximately 8½ feet of hard compacted fill composed of clayey silt and rock fragments underlain by decomposed basalt to the extent of the boring at 20.0 feet. Either of these materials can provide adequate support for the retaining wall foundations. Foundations bearing within the fill should be designed for maximum contact bearing pressures of 2,000 pounds per square foot. If the foundations are extended to the decomposed basalt, the bearing pressure can be increased to 6,000 pounds per square foot. A friction factor of 0.55 should be utilized for sliding resistance of both materials.

Retaining walls utilized to support the existing fill should be designed for equivalent fluid pressures of 40 pounds per cubic foot for a level backfill condition and 55 pounds per cubic foot equivalent fluid pressure for a 2:1 backfilling condition. All walls should be provided with drains and weepholes to prevent the buildup of hydrostatic pressures.

In all areas to receive fill, the existing vegetation should be removed along with any other deleterious materials. The surface should then be benched to properly bond the newly placed fill to the existing ground surface. The fill should be placed and compacted in accordance with the City and County Grading Ordinance. It is recommended that a maximum fill slope of 2:1 be utilized for embankment constructed with the on-site materials. This will necessitate that no fill be placed in areas with existing slopes steeper than 2:1.

In summary, the subsurface explorations disclosed that the site is underlain by competent weathered basalt and compacted fill which should provide adequate support for the proposed structures without detrimental settlements providing the recommendations given above are followed.

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The analysis, conclusions and recommendations contained in our report are based upon the site conditions as they exist at the time of our investigation and further assumes that the exploratory borings are representative of the subsurface conditions throughout the site and that the conditions elsewhere on the project are not significantly different from those disclosed in the test borings.

Unanticipated soil conditions are commonly encountered and cannot be fully determined by soil samples, test borings or test pits. Such unexpected conditions frequently require that additional expenditures be made to attain a properly constructed project. Therefore, some contingency funds are recommended to accommodate such potential extra costs.

If you have any questions, please do not hesitate to contact us.

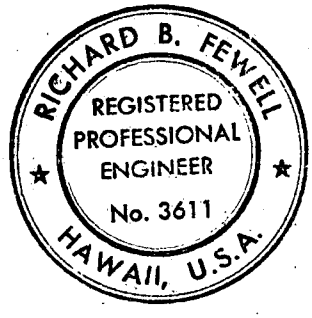
Respectfully submitted,

FEWELL GEOTECHNICAL ENGINEERING, LTD.

Richard B. Fewell, P.E.

RBF/fse

Enclosures



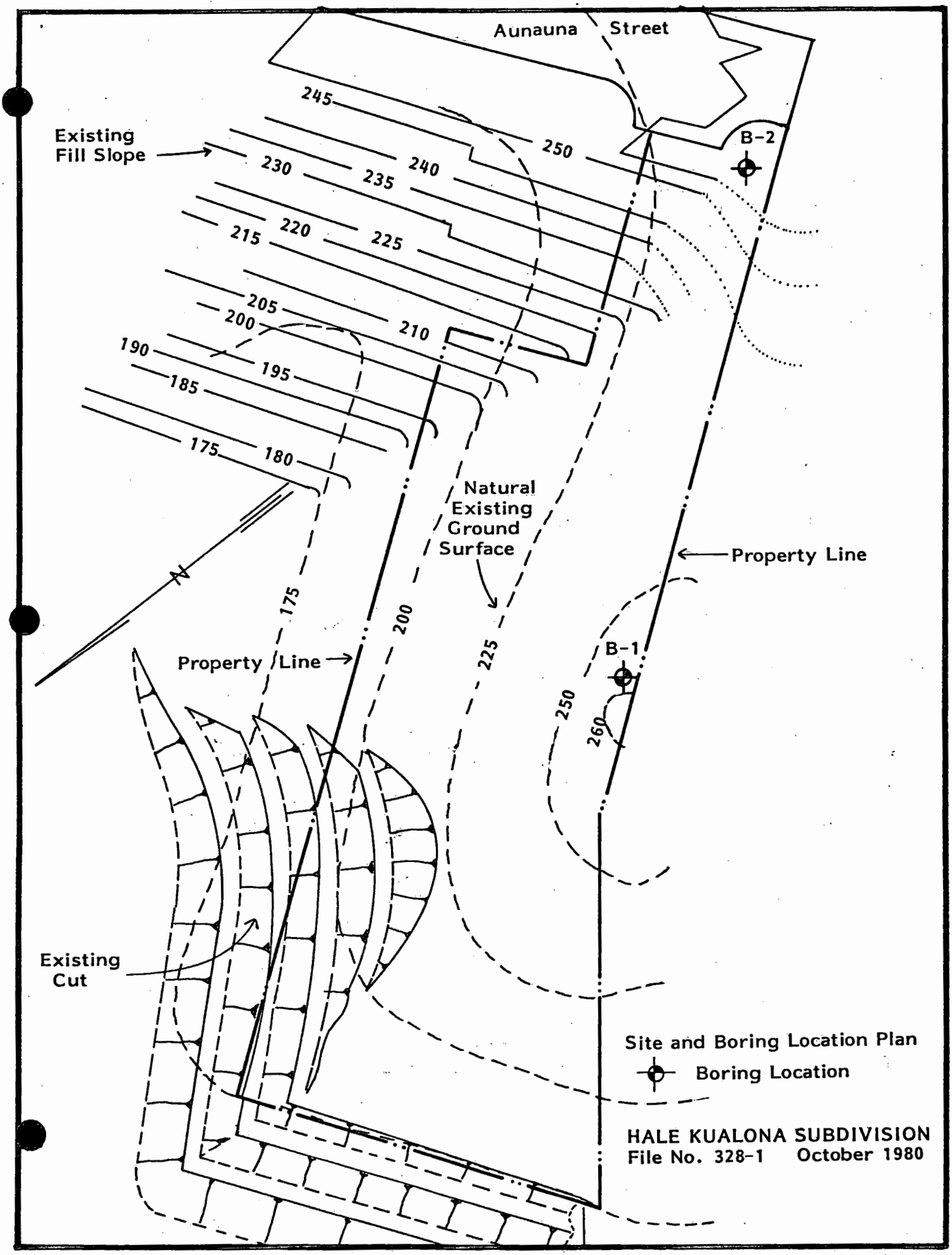

Aunauna Street
Existing Fill Slope
245
250
240
230
235
220
225
215
205
210
200
190
195
185
175
180
B-2
Natural Existing Ground Surface
Property Line
175
200
225
Property Line
B-1
250
260
Existing Cut
Site and Boring Location Plan
Boring Location
HALE KUALONA SUBDIVISION
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Figure 1

Depth in Feet	Sample Number	Log and Location	Auger Penetration Resistance	Boring 1 (Auger Probe) File 328-1 Elevation 259 Datum Date 10-6-80 Water Level None	Dry Density, Pcf	Moisture Content, %	Unconfined Strength, Ksf	Torvane, Ksf	Direct Shear Parameters	
				Description					ϕ	C, ksf
0			Hard Easy Hard Easy	Light Gray Decomposed BASALT with some soft seams, friable, soft to medium hard						
5			Hard Easy	Light Brown Decomposed BASALT, friable, soft to medium hard						
10			Easy	Tan Decomposed BASALT with some hard seams, friable, medium dense						
15										
20			Hard	Light Gray Decomposed BASALT, medium hard to hard						
25			Easy	Gray Decomposed BASALT, friable, soft to medium hard						
30										

Figure 2

Depth in Feet	Sample Number	Log and Location	Penetration Resistance	Boring 1 (Auger Probe) File 328-1 Elevation cont'd Datum Date 10-6-80 Water Level None	Dry Density, Pcf	Moisture Content, %	Unconfined Strength, Ksf	Torvane, Ksf	Direct Shear Parameters	
				Description					ϕ	C, ksf
30			Easy	Gray Decomposed BASALT, friable, medium hard						
35				Boring terminated at 35.0 feet						

Figure 2

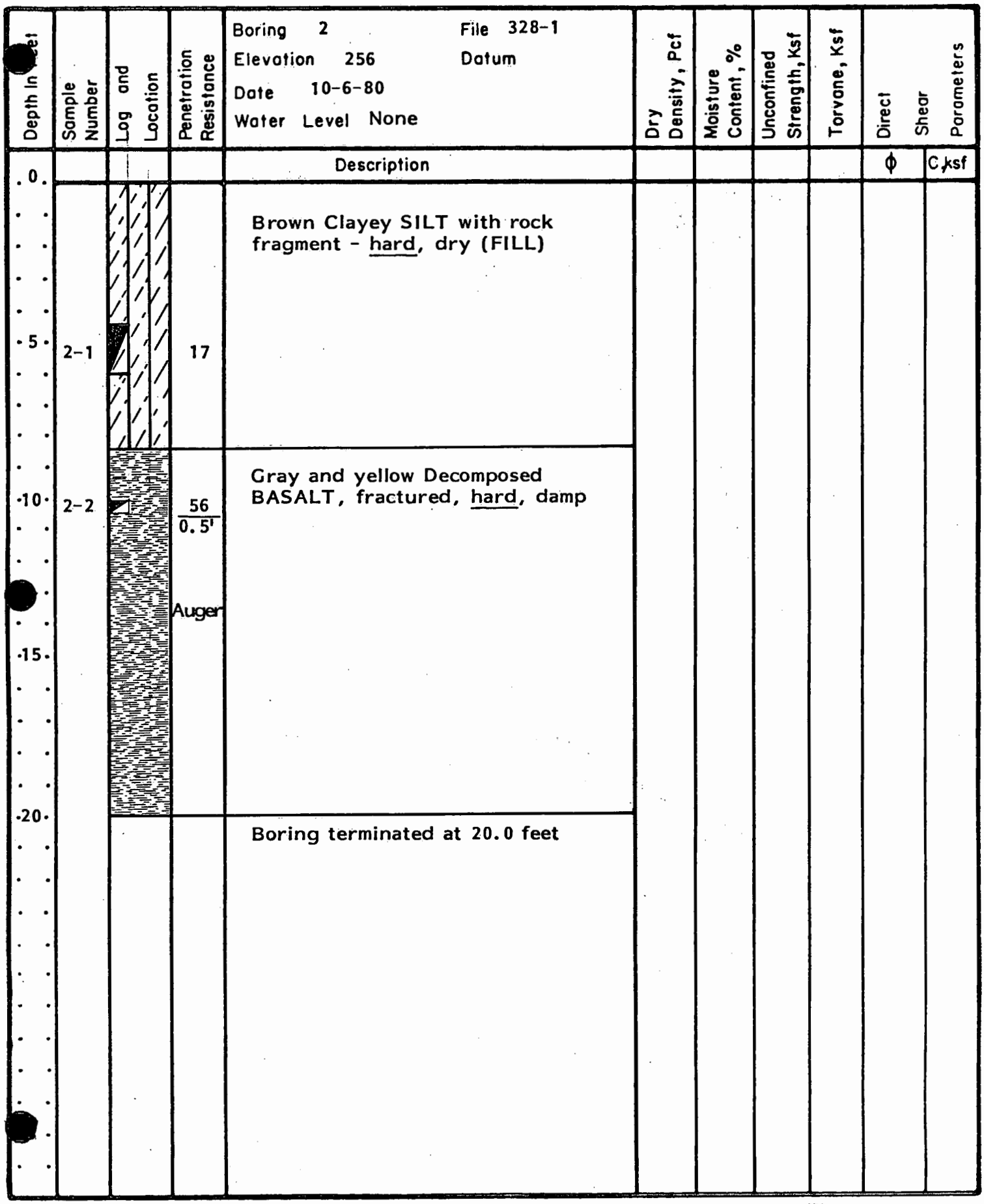
Depth in Feet
Sample Number
Log and Location
Penetration Resistance
Boring 2
File 328-1
Elevation 256
Datum
Date 10-6-80
Water Level None
Dry Density, Pcf
Moisture Content, %
Unconfined Strength, Ksf
Torvane, Ksf
Direct Shear Parameters
Description
ϕ
C, ksf
0
5
10
15
20
2-1
2-2
17
56
0.5'
Auger
Brown Clayey SILT with rock fragment - hard, dry (FILL)
Gray and yellow Decomposed BASALT, fractured, hard, damp
Boring terminated at 20.0 feet

Figure 3